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A NEW SPECIES OF FULMAR FROM THE MIOCENE OF
KERN COUNTY, CALIFORNIA (AVES: PROCELLARIIDAE)

By Hildegard Howard

Abstract.-- A new species of fulmar from the Miocene of Kern County, California (Aves: Procellariidae). Bull. Southern California Acad. Sci., Fulmarus miocen^aus is described from a humerus found in the middle Miocene, Round Mountain Silt of the Sharktooth Hill Bonebed, Kern County, California, U.S.A. The specimen represents a smaller species than Fulmarus hammeri, the only other Tertiary fulmar recorded from California. It is also smaller than the humerus of Recent species of fulmars and is further distinguished therefrom by better developed bicipital area and more distally placed ectepicondylar prominence.

INTRODUCTION

Among the avian fossils collected in 1979 from the Middle Miocene Sharktooth Hill Bonebed in Kern County, California, was a small, fragmentary humerus suggesting relationship to the Procellariidae. This family, which includes the fulmars, petrels and shearwaters, is well represented in the Bonebed by three species of shearwaters, genus Puffinus. After expert preparation of the fragile humerus, it becomes evident that this specimen represents a species more closely allied to the fulmars than to the shearwaters.

Although the Recent species, Fulmarus glacialis, is recorded (Miller, 1914, and Howard 1949) from the Pleistocene of California, there is only one Tertiary fulmarine record for the state. Fulmarus hammeri Howard 1968 was described from the Monterey Formation (late Miocene) of Orange County. The holotype of F. hammeri is a proximal end

of carpometacarpus, with a distal fragment of humerus referred. The small size of the Sharktooth Hill specimen immediately distinguishes it from the referred humerus of F. hammeri.

ACRONYMS USED

LACM -- Natural History Museum of Los Angeles County

USNM -- National Museum of Natural History, Smithsonian Institution

COMPARATIVE MATERIAL AVAILABLE

In addition to the single fossil humeral fragment referred to Fulmarus hammeri (LACM no. 18263), humeri of the following Recent species of Procellariidae were available for comparison with the Sharktooth Hill specimen: Fulmarus glacialis rodgersi (7 specimens), F. glacialoides (1), Thalassoica antarctica (1), Daption capense (1), Pagodroma nivea (1), Pterodroma phaeopygia (1), Halobaena caerulea (1), Pachyptila vittata (1), Puffinus creatopus (2), P. pacificus (1), P. griseus (2), and Opisthomelas (11). All specimens of Fulmarus glacialis and of the several species of Puffinus are from the LACM collections, the other Recent material is from USNM.

DESCRIPTION

The humerus (LACM 122995) from the Sharktooth Hill Bonebed is distinguished from this element in the shearwaters (genus Puffinus) by the deltoid crest having a prominent, projecting, hooklike point, the bicipital crest longer and clearly delimited distally, the ectepicondylar prominence short and blunt, the entepicondyle more rounded, less blade-like, in its proximal extension anconally, and the shaft above the brachial depression broad laterally and shallow in palmar-anconal dimension.

In these characters resemblance is closest to the humerus of the fulmars, Fulmarus glacialis, ^{and} F. glacialoides, ^{the petrels,} and Thalassoica ✓

of
antarctica, and Daption capense. The humeri of Thalassoica and Daption,
 however, are relatively broader proximally and have a marked depression
 on the anterior surface of the shaft immediately below the head, a depression which is
 not present in the two Recent species of Fulmarus or in the fossil.
 Also, in Daption, the point of the deltoid crest is less sharply
 hooked.

The prominently projecting deltoid crest, with hooklike point,
 is also present in members of the genus Pterodroma. P. phaeopygia,
 the one species of this genus available for comparison, resembles
 the shearwaters, however, in the long, pointed ectepicondylar
 prominence and blade-like proximal extension of the entepicondyle
 anconally. Other petrels, such as Pagodroma nivea, Halobaena caerulea,
 and Pachyptila vittata, although having a more pointed deltoid crest
 than in the shearwaters, lack the hooklike quality of the point.
 The Pagodroma humerus is further distinguished from the fossil by
 the depression of the shaft below the head. In Pachyptila vittata
 the bicipital crest is short as in Puffinus, and in Halobaena caerulea
 the pectoral attachment is longer and narrower than in the fossil
 humerus, and the ectepicondylar prominence is wider.

Although the characters of the Sharktooth Hill humerus most
 closely resemble those found in Fulmarus, the differences noted are
 more marked than those that distinguish the two Recent species of
 that genus. In view of the similarities noted in the humeri of
Thalassoica and Daption to that of Fulmarus, it is possible that a
 distinct, perhaps ancestral, genus is represented by this Miocene
 bone. With the limited knowledge at hand, however, it is considered
 advisable to record this single specimen as a new species under the
 genus Fulmarus.

Fulmarus miocen^aus n. sp.

Holotype.-- Nearly complete left humerus, Natural History Museum of Los Angeles County no. 122995, collected by Howell W. Thomas in 1979.

Locality.-- LACM locality 3162, Sharktooth Hill Bonebed, Kern County, California.

Formation and age.-- Round Mountain Silt, Middle Miocene, Barstovian Land Mammal Age.

Diagnosis.-- Distinguished from the humerus of Fulmarus glacialis and F. glacialoides by small size (see table) and the following morphological characters: shaft, anconally below head, less acutely angular, with capital shaft ridge more median in position and less proximal in extent; bicipital crest relatively longer, with contour more evenly rounded and, viewed from palmar side, distal termination more clearly marked and bicipital surface more swollen; ectepicondylar prominence less raised above distal end (ratio of height of prominence above distal end to breadth of distal end 82 percent, as compared to 92-95 percent in F. glacialis and 102 percent in F. glacialoides). Distinguished from humerus of Miocene species, Fulmarus hammeri by smaller size (height of ectepicondylar prominence 7.8 mm above distal end as compared to 13.0 mm in F. hammeri).

Measurements.-- See Table 1.

CONCLUSION

The new species, Fulmarus mioc^aenus, brings the total number of avian species described from the Sharktooth Hill Bonebed to nine, and adds a fourth species to the Family Procellariidae named from this locality. The other members of the family are the shearwaters Puffinus inceptor Wetmore 1930, P. priscus Miller 1961 and P. mitchelli Miller 1961.

Although the Family Procellariidae is well represented in the Tertiary fossil record by the genus Puffinus, the Sharktooth Hill specimen, here described, is only the second species of fulmar to be described, and the third fulmarine record for the Tertiary. In addition to Fulmarus hammeri from the Miocene of Orange County, California, Fulmarus sp. was recorded from the Miocene of Maryland (Wetmore 1926) on the basis of a shaft of humerus said to resemble Fulmarus glacialis in "size and structure." The Maryland specimen is presumably too large to be attributable to Fulmarus mioc^aenus.

ACKNOWLEDGMENTS

Howard 1957, a "gigantic" marine bird from the Miocene of California. Sank Barbara Mus not yet Det. Geol. Bull. 1, 23 p.

8 X Mitchell, E. 1965. History of Research at Sharktooth Hill, Kern County, California. Special Publ. Kern County Historical Soc. and County of Kern through its Museum, 45 pp., 14 figs.

Miller A. 1944

6 X Miller, Loe 1961. Birds from the Miocene of Sharktooth Hill, California. Condor 63:399-402.

7 X ----- 1962. A new albatross from the Miocene of California. Condor 64: 471-472.

11 X Wetmore, Alexander 1930. Fossil bird remains from the Temblor Formation near Bakersfield, California. Proc. California Acad. Sci., ser. 4, 19:85-93

Howard, Hildegard 1966. Additional avian records from the Miocene of Sharktooth Hill, California. Los Angeles Co. Mus. Contrib. in Science no. 114, 11 pp.

----- 1968. Tertiary birds from Laguna Hills, Orange County, California. Los Angeles Co. Mus. Contrib. Sci. no. 142: 21 pp.

X Warter, Stuart, 1976. A new osprey from the Miocene of California (Falconiformes: Pandionidae). ~~xxxxxx~~IN Collected Papers in Avian Paleontology Honoring the 90th Birthday of Alexander Wetmore, Storrs L. Olson, Ed. Smithsonian Contrib. Paleobiology no. 27:133-139.

78.3
32
1.0

XV10 Wetmore, Alexander 1926. Observations on fossil birds described from the Miocene of Maryland. Auk 48(4):462-468 (Fulmarus pp. 464-465).

① Brainerd R 1943

Catalogue of Fossil Birds Part 1 Archaeopterygiformes through Anseriformes. Bull. Florida State Mus., Biol. Sci. 7(4): 179-293.

5 X Miller, A.H. 1944.

An avifauna from the lower Miocene of South Dakota. Univ. California Publ. Geol. 27(4): 85-100.

A new species of fulmar, Fulmarus miocenus is represented by a humerus from the middle Miocene Round Mountain site of the Sharktooth Hill Bench in Kern County, California USA. This is the only specimen of Fulmarus recorded from California. It is distinguished from the recent species of Fulmarus by its smaller size and by its more robust structure. It is distinguished from the recent species of Fulmarus by its smaller size and by its more robust structure. It is distinguished from the recent species of Fulmarus by its smaller size and by its more robust structure.

This is a very different specimen than the only one from California recorded from California. It is distinguished from the recent species of Fulmarus by its smaller size and by its more robust structure. It is distinguished from the recent species of Fulmarus by its smaller size and by its more robust structure.

NEW AVIAN RECORDS FROM THE SHARKTOOTH HILL BONEBED
KERN COUNTY, CALIFORNIA

The middle Miocene marine deposits of the Sharktooth Hill Bonebed have been discussed in detail by Mitchell (1965). His listing of the fauna recovered from these beds (sharks, bony fishes, reptiles, birds and mammals) included the following birds:

Diomedea californica Miller 1962 (Albatross)

Puffinus inceptor Wetmore 1930 (Shearwater)

P. priscus Miller 1961

P. mitchelli Miller 1961

Puffinus sp. (cf. P. conradi) Wetmore 1930

Morus vagabundus Wetmore 1930 (Gannet)

Morus sp. (Miller 1961)

Presbychen abavus Wetmore 1930 (goose)

Branta sp. (goose) Miller 1961

Recurvirostra (Avocet) Miller 1961

described another

Howard (1966) ~~added another~~ species, Diomedea milleri,
17

and noted ~~added~~ specimens in the collections of the Natural History Museum of Los Angeles County assignable to several of the previously described forms. ~~and~~ Warter (197) described the Osprey, Pandion homalopteron, bringing the total # of sp. described from STH to 8.

As collecting has continued at Sharktooth Hill ~~added~~

~~added~~ more than 120 avian specimens have been added to the LACM collections, A study of this material has ~~revealed~~

representing genera

at least three species/previously unrecorded from the Bonebed,

~~Also~~ Fulmarus ~~sp.~~ Megapaloelodus ~~sp.~~, Osteodontornis ~~sp.~~

Also many additional specimens reverable to Presbychen provide information as to its relationships.

This material is now under study. The present paper ~~concerns~~ ^{from collection 1979 that} concerns a small humerus representing a fulmar-like bird ^{Family Procellariidae} previously unknown to science. Although this family is well represented in the Miocene of California (including Sharktooth Hill) by specimens referable to the shearwaters, genus Puffinus, there is only one Tertiary record of a fulmar. Fulmarus hammeri Howard 1968 from the later Miocene Monterey Formation in Orange County, Calif. was described from a...

↑
ADDITIONAL AVIAN RECORDS FROM THE MIOCENE OF KERN COUNTY, CALIFORNIA
WITH THE DESCRIPTION OF A NEW SPECIES OF FULMAR (AVES:PROCELLARIIDAE)

By Hildegarde Howard

↑
Abstract.-- Additional avian records from the Miocene of Kern County, California with the description of a new species of fulmar (Aves:Procellariidae) by Hildegarde Howard. Previously unrecorded avian taxa from the middle Miocene Sharktooth Hill Bonebed in Kern County, California are listed: Fulmarus n. sp., (Osteodontornis orri, Ciconiidae gen. and sp. to be determined, and Megapaloelodus sp. Fulmarus miocaenus n. sp. is described from a humerus representing a smaller species than F. hammeri, the only other Tertiary fulmar recorded from California. It is also smaller than humeri of Recent species of fulmars and is further distinguished therefrom by a better developed bicapital area and more distally placed ectepicondylar prominence.

cap 1c INTRODUCTION

The middle Miocene marine deposits of the Sharktooth Hill Bonebed in Kern County, California were discussed in detail by Mitchell (1965). His listing of the fauna recovered from these beds (sharks, bony fishes, reptiles, birds and mammals) included the following birds:

Albatross--Diomedea californica Miller 1962

Shearwaters--Puffinus inceptor Wetmore 1930, P. priscus

~~Miller 1961~~, P. mitchelli Miller 1961

Gannets--Morus vagabundus Wetmore 1930, Morus sp.

(Miller 1961)

Waterbirds--Presbychen abavus Wetmore 1930, Branta sp.

(Miller 1961)

Shorebirds--Recurvirostra sp. (Miller 1961)

As collecting continued in the years following Mitchell's report, a second albatross, Diomedea milleri Howard 1966 and an osprey, Pandion homalopteron Warter 1976, were added.

The collections at the Natural History Museum of Los Angeles County now contain over 120 unrecorded avian specimens from Sharktooth Hill. Included among these are representatives of four taxa not noted in the above listing:

Order Procellariiformes, Family Procellariidae

Genus Fulmarus, n. sp.

Order Pelecaniformes, Family Pseudodontornithidae

Genus and species Osteodontornis ?orri Howard 1957

Order Ciconiiformes, Family Ciconiidae

Genus and species to be determined

Order Charadriiformes, Family Phoenicopteridae

Genus Megapaloelodus A. Miller 1944, species to be determined

The present paper concerns the description of Fulmarus n. sp. The material representing the other taxa is under ^{discussion thereof} study and will be presented at a later date.

Methods + Materials
ACRONYMS USED

Acronyms used

LACM -- Natural History Museum of Los Angeles County

USNM -- National Museum of Natural History, Smithsonian Institution

← COMPARATIVE MATERIAL AVAILABLE ;

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Fossil: Hammeri fragment of humerus of

In addition to the single fossil humeral fragment referred to

Fulmarus hammeri (LACM 18263), humeri of the following Recent

Recent Hammeri of species of Procellariidae were available for comparison with the

xv Sharktooth Hill specimen: Fulmarus glacialis rodgersi (7), F.

glacialoides (2), Thalassoica antarctica (1), Daption capense (2)

Pagodroma nivea (1), Pterodroma phaeopygia (1), P. lessoni (1),

Halobaena caerulea (2), Pachyptila vittata (2), Puffinus creatopus

(2), P. griseus (2), P. opisthomelas (11), P. pacificus (1). *AE1 le*

specimens of Fulmarus glacialis, one each of F. glacialoides, *tr*

Daption capense, Halobaena caerulea, Pterodroma lessoni, Pachyptila

vittata and all of the several species of Puffinus are from the LACM

collections; the other Recent material was loaned by USNM.

DESCRIPTION

Among the avian fossils collected from Sharktooth Hill in 1979 was a small, fragmented humerus bearing similarities to those of *(LACM 122995)*

the family Procellariidae. This family, which includes the fulmars,

petrels and shearwaters, is *in the Bonin* well represented at Sharktooth Hill by

more than thirty bones three species of shearwaters, genus Puffinus. After expert

the LACM 122995 preparation of the fragile humerus, it became evident that the

specimen represents a species more closely allied to the fulmars

than to the shearwaters.

Although the living Fulmarus glacialis is recorded from the Pleistocene of California and Norway (Brodkorb 1963, p. 245), there are only two Tertiary records of the genus. Both are of Miocene age.

Only one of these was described, F. hammeri Howard 1968, from

California. The other, a *portion the shaft of* fragment of humerus from Maryland, was

recorded as Fulmarus sp. (Wetmore 1926). Both represent/larger species of

size than that represented by the specimen from Sharktooth Hill.

with holotype comparisons & referred to the fragment of humerus

A NEW SPECIES OF FULMAR FROM THE MIOCENE OF
KERN COUNTY, CALIFORNIA (AVES: PROCELLARIIDAE)

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Abstract.-- A new species of fulmar from the Miocene of Kern County, California (Aves: Procellariidae). Bull. Southern California Acad. Sci., .Fulmarus miocaenus n. sp. is described from a humerus found in the middle Miocene Round Mountain Silt of the Sharktooth Hill Bonebed, Kern County, California, U.S.A. The specimen represents a smaller species than Fulmarus hammeri, the only other Tertiary fulmar recorded from California. It is also smaller than the humeri of Recent species of fulmars and is further distinguished therefrom by a better developed bicapital area and more distally placed ectepicondylar prominence.

INTRODUCTION

Among the avian fossils collected in 1979 from the middle Miocene Sharktooth Hill Bonebed in Kern County, California, was a small, fragmented humerus bearing similarities to those of the family Procellariidae. This family, which includes the fulmars, petrels and shearwaters, is represented in the Sharktooth Hill Bonebed by 38 bones of three species of shearwaters, genus Puffinus. After expert preparation of the fragile humerus, it became evident that the specimen represents a species more closely allied to the fulmars than to the shearwaters.

Although the living Fulmarus glacialis is recorded from the Pleistocene of California and Norway (Brodkorb 1963, p. 245), only

there are only two Tertiary records of the genus, both of Miocene age. Only one of these, Fulmarus hammeri Howard 1968, from California, has been described. The other, a fragment of humerus from Maryland was recorded (Wetmore 1926), as Fulmarus sp. F. hammeri was described from the proximal end of a carpometacarpus, with the distal fragment of the external side of a humerus referred. The size of the latter immediately distinguishes it from the humerus from Sharktooth Hill.

ACRONYMS USED

LACM -- Natural History Museum of Los Angeles County

USNM -- National Museum of Natural History, Smithsonian Institution

COMPARATIVE MATERIAL AVAILABLE

In addition to the single fossil humeral fragment referred to Fulmarus hammeri (LACM no. 18263), humeri of the following Recent species of Procellariidae were available for comparison with the Sharktooth Hill Specimen: Fulmarus glacialis rodgersi (7), F. glacialoides (2), Thalassoica antarctica (1), Daption capense (2), Pagodroma nivea (1), Pterodroma phaeopygia (1), P. lessoni (1), Halobaena caerulea (2), Pachyptila vittata (2), Puffinus creatopus (2), P. griseus (2), P. opisthomelas (11), P. pacificus (1). All specimens of Fulmarus glacialis, one each of F. glacialoides, Daption capense, Halobaena caerulea, Pterodroma lessoni, Pachyptila vittata and all of the several species of Puffinus are from the LACM collections; the other Recent material was loaned by USNM.

capitulum
~~GENERIC ANALYSIS~~
DESCRIPTION

✓ *Generic analysis*
The humerus (LACM 122995) from the Sharktooth Hill Bonebed is distinguished from this element in the shearwaters (genus Puffinus) by the deltoid crest having a prominently projecting, hooklike point, the bicipital crest longer and clearly delimited distally, the ectepicondylar prominence short and blunt, the entepicondyle more rounded and less bladelike in its proximal extension anconally, and the shaft above the brachial depression broad laterally and shallow in its palmar-anconal dimension.

In these characters resemblance is closest to the humerus of the fulmars, Fulmarus glacialis and F. glacialoides, and the petrels, Thalassoica antarctica and Daption capense. The humeri of Thalassoica and Daption, however, are relatively broader proximally and have a marked depression of the shaft immediately below the head, a depression on the anconal surface which is not present in the two Recent species of Fulmarus or in the fossil at hand. Also, in Daption, the point of the deltoid crest is less sharply hooked.

The prominently projecting deltoid crest, with its hooklike point, is also present in members of the genus Pterodroma. The two species of this genus available for comparison (P. lessoni and P. phaeopygia), however, resemble the shearwaters in the long, pointed ectepicondylar prominence and blade-like proximal anconal extension of the entepicondyle. Other petrels, such as Pagodroma nivea, Halobaena caerulea, and Pachyptila vittata, lack the hooklike quality of the deltoid crest, although it is more pointed in these species than in the shearwaters. The Pagodroma humerus is further distinguished from the fossil by the depression of the

Conclusion

Continued collecting in the Sharktooth Hill Bonebed in Kern County, California has resulted in the addition of specimens representing four avian families, three of which are previously unrecorded from this middle Miocene site. The newly recorded families are the bony-toothed birds, Family Pseudodontornithidae; the storks, Family Ciconiidae; and the flamingos, Family Phoenicopteridae.

Continued collecting in the Sharktooth Hill Bonebed in Kern County, California has resulted in the addition of specimens representing three families previously unrecorded from this middle Miocene site: the bony-toothed birds, Family Pseudodontornithidae, the storks, Family Ciconiidae; and the flamingos, Family Phoenicopteridae. Also added is a new species of the Family Procellariidae, *Fulmarus miocaenus* n.sp. ~~formerly~~ well represented

three families previously unrecorded from this middle Miocene site and a fourth species to the Family Procellariidae. Also a fulmar, *Fulmarus miocaenus* n.sp.

Also a ~~new species~~ *Fulmarus miocaenus* is added to the Family Procellariidae, formerly well represented in the Bonebed only by the shearwaters, genus *Puffinus*.

Continued collecting in the Sharktooth Hill Bonebed in Kern County, California has resulted in the addition of specimens representing three families previously unrecorded from this middle Miocene site: the bony-toothed birds, Family Pseudodontornithidae; the storks, Family Ciconiidae; and the flamingos, Family Phoenicopteridae. Also a fulmar, *Fulmarus miocaenus* n. sp. is added to the Family Procellariidae, formerly well represented in the Bonebed only by the shearwaters, genus *Puffinus*. The description of the *F. miocaenus* brings the total number of avian species described from the Bonebed to nine.

Although the Family Procellariidae is well represented in the Tertiary fossil record by the genus *Puffinus*, *Fulmarus miocaenus* is only the second species of fulmar to be described, and only the third fulmarine record for the Tertiary. The identification of the latter however, *Fulmarus* sp. (from the Miocene of Maryland), is based on a small fragment of humerus is now questioned.

recruits this
includin comment on other bones

CONCLUSION

The new species, Fulmarus miocaenus, brings the total number of avian species described from the Sharktooth Hill Bonebed to nine, and adds a fourth species to the Family Procellariidae named from this locality. The other members of the family are the shearwaters Puffinus inceptor Wetmore 1930, P. priscus Miller 1961 and P. mitchelli Miller 1961.

Although the Family Procellariidae is well represented in the Tertiary fossil record by the genus Puffinus, the Sharktooth Hill specimen, heredescribed, is only the third record of the fulmars, and only the second species to be described.

ACKNOWLEDGMENTS

I am grateful to the following palaeornithologists for helpful suggestions after reading an earlier draft of this paper: Pierce Brodkorb, Kenneth E. Campbell Jr. and Storrs L. Olson. I wish, also to thank Dr. Olson for examining ⁱⁿ the "fulmarine" specimen from the Miocene of Maryland for me, and for arranging the loan of skeletons of living species of Procellariidae from USNM.

My thanks also go to my husband, Henry Anson Wylde, for his painstaking care in photographing this fragile specimen, and to Richard Meier, LACM Photographer, for preparing the excellent prints.

~~xxxxxx~~ families
The number of ~~taxa~~ represented ~~in the LACM collection~~ ⁱⁿ from the Sharktooth Hill Bonebed is now increased by ~~the discovery of~~ specimens in the LACM ~~collection~~ ^{with 1965 recent year} collected since 1975 which represent ~~the~~ the Pseudodontornithidae, Ciconiidae and Phoenicopteridae. The new species, ~~from this locality~~ ^{named here} ~~adds a fourth~~ ^{discovered} Fulmarus miocaenus ~~brings the~~ ^{adds a fourth} ~~xxxxxx~~ species to the Family Procellariidae named from this locality and brings the total number of avian species described from the Bonebed to nine.

To the already well represented family Procellariidae the genus Fulmarus adds a new sp. F. miocaenus, is added

Continued collecting in the Sharktooth Hill Bonebed



Reduce to 78.3 mm

LACM 122995

Fig. 1. Holotype humerus (LACM 122995) of Fulmarus miocenensis. Left, anconal view; right, palmar view.

X approx $1\frac{1}{3}$.

Earlier prints
finer prints are larger

A NEW SPECIES OF FULMAR (AVES:PROCELLARIIDAE) AND
ADDITIONAL AVIAN RECORDS FROM THE MIOCENE OF
KERN COUNTY, CALIFORNIA

By Hildegarde Howard¹

The middle Miocene marine deposits of the Sharktooth Hill Bonebed in Kern County, California were discussed in detail by Mitchell (1965). His listing of the fauna recovered from these beds (sharks, bony fishes, reptiles, birds and mammals) included the following birds:

Albatross Diomedea californica Miller 1962 (Albatross)

Shearwater Puffinus inceptor Wetmore 1930 (Shearwater)

Puffinus priscus Miller 1961

Puffinus mitchelli Miller 1961

Gannet Morus vagabundus Wetmore 1930 (Gannet)

Morus sp. (Miller 1961)

Waterfowl Presbychen abavus Wetmore 1930 (Goose)

Branta sp. (Goose. Miller 1961)

Shrike Recurvirostra (Avocet. Miller 1961)

Since 1965, two additional species have been described, *an avocet*, *Diomedea milleri* Howard 1966 and *Pandion homalopteron* Warter 1976) and additional specimens of the previously *named* ~~recorded~~ species have been noted (Howard 1966 and 1978:6), bringing the total number of avian specimens *recorded* ~~listed~~ from the Bonebed to 37.

As collecting has continued at Sharktooth Hill, more than 120 avian bones have been added to the collections of the Natural History Museum of Los Angeles County (LACM). ~~The Family Sulidae (Gannets~~

and Boobies) is most abundantly represented with more than 60 bones from 13 of the 17 separate sites within the Bonebed. The Shearwaters (Family Procellariidae) have 38 specimens from 8 sites, 18 bones from and the albatrosses (Diomedae) ~~xxxxxx~~ 8 sites ~~xxxxx~~ ~~xxxxxx~~ Each of these families is represented in other Miocene localities in southern California and a proper study of the Bonebed material will require careful analysis of the specimens; to determine whether or not additional species may be represented in the Bonebed material.

~~xxxxxx~~ 13 from 6 locs. (12 "Presbychen + 1 Branta)
The goose-like bones, including the ulna in the University of California, Berkeley Museum of Paleontology (UCMP) assigned to ~~xxxx~~ and will be published separately.
Branta sp. are under ~~separate~~ study at this time/

No additional bones referable to Recurvirostra are apparent.

There are now, however, four additional genera to be added to the avian fauna from ~~xxxx~~ Sharktooth Hill ~~Bonebed~~, Three of ~~which~~ ~~xxxx~~ represent families previously unrecorded from the Bonebed.

~~xxxxxxxxxxxxxxxxxxxxxx~~

The present paper is concerned with four genera not previously cited from the Sharktooth Hill Bonebed, ~~xxxxxx~~ ~~xxxxxx~~ ~~xxxxxx~~ three of which represent ~~xxxxxx~~ ~~xxxxxx~~ ~~xxxxxx~~
Fulmarus, n. p.

Order Procellariiformes

Family Procellariidae: Fulmarus n.s.

Order Ciconiiformes

Family Ciconiidae : Ciconia sp.

Palaeolodidae_ Megapaloelodus sp.

Pelicaniformes

Odontopterygia

Pseudodontornithidae

Pelagornithidae

Charadriiformes

Phoenicopteridae: Megapaloelodus

LITERATURE CITED

redo

- Brodkorb, P. 1963. Catalogue of fossil birds. Part 1
(Archaeopterygiformes through Ardeiformes). Bull.
Florida State Mus., Biol. Sci. 7(4):179-293.
- Howard, H. 1968. Tertiary birds from Laguna Hills, Orange
County, California. Los Angeles Co. Mus. Contrib.
Sci. no. 142, 21 pp.
- Miller, L. 1961. Birds from the Miocene of Sharktooth Hill,
California. Condor 63:399-402.
- Wetmore, A. 1926. Observations on fossil birds described
from the Miocene of Maryland. Auk 48:462-468.
- _____ 1930. Fossil bird remains from the Temblor
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California Acad. Sci., ser. 4, 19:85-91.

Mitchell

1945

Walter

Howard

D. Mitchell

Conclusion

Fulmarus miocaenus n. sp. ~~xxx~~ is the ninth species to be described from the Sharktooth Hill Bonebed, and the fourth species of the Family Procellariidae named from this middle Miocene site. The other members of the family are the shearwaters Puffinus inceptor, P. mitchelli and P. priscus. Although ~~this family is well~~ the shearwaters are well represented in the TERTIARY FOSSIL RECORD, Fulmarus miocaenus is only the second species of fulmar to be described and only the third fulmarine record for the Tertiary. In addition to P. hammeri ^{described} from the Miocene of Orange County, California, Fulmarus sp. was recorded from the Miocene of Maryland. Based on a ~~small~~ fragment of humeral shaft, the generic assignment of the Maryland specimen is now questioned.

Whether the species represented by the additional families herein recorded from the Bonebed--Pseudodontornithidae, Ciconiidae and Phoenicopteridae--are assignable to species previously described from other fossil sites, or represent species new to science is yet to be determined.

Acknowledgments

I am grateful to the following paleornithologists for helpful suggestions after reading an earlier draft of this paper: Pierce Brodkorb, Kenneth E. Campbell jr. and Storrs L. Olson. I wish, also, to thank ^{and} Dr. Olson ^{"fulmarine"} for examining the "fulmarine" specimen from the Miocene of Maryland for me, ^{also} and for arranging the loan of skeletons of living species of Procellariidae from USNM. ^{increase of} My thanks also go to my husband, Henry Anson Wylde, for his painstaking care in photographing ~~this~~ ^{the} fragile specimen of Fulmarus miocaenus, and to Richard Meier, LACM Photographer, for preparing ^{H&M} the excellent prints.

I wish to thank Howell W. Thomas for his gift of fossils collected ^{where by} at the Sharktooth Hill Bonebed.
Howard

Conclusion

Fulmarus miocaenus n. sp. is the ninth species to be described from the Sharktooth Hill Bonebed, and the fourth species of the family Procellariidae named from this middle Miocene site. The other members of the family are the shearwaters Puffinus inceptor, P. mitchelli and P. priscus. Although the shearwaters are well represented in the Tertiary fossil record, Fulmarus miocaenus is only the second species of fulmar to be described, and only the third fulmarine record for the Tertiary. In addition to P. hammeri described from the Miocene of Orange County, California, Fulmarus sp. was recorded from the Miocene of Maryland. Based on a fragment of humeral shaft, the generic assignment of the Maryland specimen is now questioned.

Whether the species represented by the additional families herein recorded from the Bonebed--Pseudodontornithidae, Ciconiidae and Phoenicopteridae--are assignable to species previously described from other fossil sites, or represent species new to science is yet to be determined.

Acknowledgments

I wish to thank Howell W. Thomas for his gift to LACM of fossils that he collected at the Sharktooth Hill site, *which included the specimen here described as Fulmarus miocaenus.*

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My thanks go to my husband, Henry Anson Wylde, for his painstaking care in photographing the fragile holotype of Fulmarus miocaenus, and to Richard Meier, LACM Photographer, for preparing the excellent prints.

Legend for Figure 1

Fig. 1. Holotype humerus (LACM 122995) of Fulmarus Miocaenus

n. sp. Left, anconal view; right, palmar view.

x approx. $\frac{1}{3}$. Greatest length of specimen 78.3 mm.

110
78
32

26.1

Set. 1 (H): 122-123.

Thompson (1961). Bull. Florida State Mus. 10:1.

Proskop, B. Catalogue of fossil birds. Part I (Archaeopteryx to 1800).

California Acad. Sci. 1: 12-13.

Formation near Berkeley, California. Proc.

1830. Fossil bird remains from the Miocene

from the Miocene of Maryland. Vol. 18: 122-123.

Netter, A. 1830. Observations on fossil birds described

California. Condor 3: 333-334.

1841. Birds from the Miocene of Sharktooth Hill,

Calif. Condor 8: 31-32.

San Diego, California. Bull. California Mus. 1: 1.

Miller, I. 1841. Birds from the Pliocene of

Calif. No. 1: 1-2.

Condor, California. Los Angeles Co. Mus. Contr.

1888. Fossil birds from Tule Lake, California

of California. Condor 21: 30-31.

Howard, H. 1898. Various fossils from the marine Pliocene

California. Bull.

Howard, H.